

# Multi-Hazard Mitigation Plan

## 5.0 Mitigation Strategy

**44 CFR Requirement 201.6(c)(3):** *The plan shall include a mitigation strategy that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

This section describes the mitigation strategy process and mitigation action plan for this Sutter County Multi-Hazard Mitigation Plan. This section describes how the County accomplished Step 3 of FEMA’s 4 Step guidance: “Developing the Mitigation Plan” and includes the following CRS steps from the older 10-step guidance:

- Step 6: Set Planning Goals
- Step 7: Review Possible Activities
- Step 8: Draft an Action Plan

### 5.1 GOALS AND OBJECTIVES

Up to this point in the planning process, the HMPC has organized resources, assessed natural hazards and risks, and documented mitigation capabilities within the county and participating jurisdictions. A profile of Sutter County’s vulnerability to natural hazards resulted from this effort, which is documented in the preceding chapters of this plan. The resulting goals, objectives, and mitigation actions were developed based on this profile. The HMPC developed this section of the plan with a series of meetings and exercises designed to achieve a collaborative mitigation planning effort as described further in this section.

During the initial goal setting meeting, AMEC reviewed the results of the hazard identification, vulnerability assessment and capability assessment with the HMPC. This analysis of the risk assessment identified areas where improvements could be made, providing the framework for the HMPC to formulate planning goals, objectives and the ultimate mitigation strategy for the Sutter County Planning Area.

Goals were defined for the purpose of this mitigation plan as broad based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and

- Are time-independent, in that they are not scheduled events.

Goals are stated without regard for implementation, that is, implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that the goals are not dependent on the means of achievement. Goals statements form the basis for objectives and measures that will be used as means to achieve the goals. Objectives define strategies to attain the goals, and are more specific and measurable.

Team members were given a list of sample goals to consider. The HMPC was instructed that they could use, combine or revise the statements they were provided or develop new ones on their own, keeping the risk assessment in mind. Team members were provided two index cards each and asked to write a goal statement on each card. Goal statements were collected and grouped into similar themes and pasted onto the wall of the meeting room. The goal statements were then attached to the meeting-room wall, and grouped into similar topics. New goals that represented the team's input were written until consensus was formed amongst the team. Some of the statements were determined to be better suited as objectives or actual mitigation projects, and were set aside for later use. Using this information, objectives were then developed, based on the team's input that summarizes strategies to achieve each goal. Initial mitigation recommendations that were developed by the HMPC are listed under the appropriate Goal and Objective. As part of the prioritization process described later in this section, prioritized mitigation measures were further developed into projects as part of the overall mitigation strategy for this plan.

Based upon the risk assessment review and goal setting process, the HMPC developed the following goals with several objectives and associated mitigation measures. The group also developed a Master Goal/Mission Statement that captured the overall intent of identified goals and objectives. In addition to the goals and objectives developed for the entire Planning Area, two participating jurisdictions also identified goals and/or objectives specific to their jurisdiction. These goals and objectives provide the direction for reducing future hazard-related losses within the Sutter County Planning Area.

## **Sutter County Planning Area Master Goal/Mission Statement**

*To develop sustainable communities to preserve life, protect property, the environment, and the economy from natural hazards by improving the communities' capabilities to prevent losses*

**GOAL 1: Improve community awareness about hazards that threaten our communities and identify appropriate actions to minimize their impacts upon people and property.**

*Objective 1.1: Increase public awareness about the nature and extent of hazards they are exposed to, where they occur, and recommend responses to identified hazards (create/continue an outreach program, provide educational resources and training)*

1.1.1 Provide information regarding sheltering options

- 1.1.2 Provide information regarding data sites where the hazard progression can be tracked (e.g., websites, brochures)
- 1.1.3 Provide information on flood preparedness
  - 1.1.3.1 Supplies
  - 1.1.3.2 When and how to evacuate
  - 1.1.3.3 Designated TV/Radio channels for Public Information

**GOAL 2: Minimize Risk and Vulnerability to Flood Hazards**

*Objective 2.1: Improve the integrity of the levees to at least 100-year flood protection*

*Objective 2.2: Eliminate open drainage ditches within 20' of traveled roadways within urbanized areas*

*Objective 2.3: Minimize damage/loss to roads*

*Objective 2.4: Identify/Protect evacuation routes*

*Objective 2.5: Reduce localized flooding from storm events*

*Objective 2.6: Provide Protection for community critical facilities*

**GOAL 3: Reduce Agricultural Losses**

*Objective 3.1: Noxious weed abatement*

**GOAL 4: Maintain Coordination of Disaster Plans with other Community Plans**

*Objective 4.1: Coordinate with changing DHS needs*

- 4.1.1 NIMS
- 4.1.2 DMA planning
- 4.1.3 Emergency Operations Plans

*Objective 4.2 Coordinate with Community Plans*

- 4.2.1 Community General Plans
- 4.2.2 Master Drainage Studies
- 4.2.3 Intergovernmental Agency Disaster Planning
  - 4.2.3.1 Duty Roster
  - 4.2.3.2 Available Equipment (e.g., sandbags, pumps)

*Objective 4.3 Coordinate with other counties and inter-county coordination among districts*

## City of Live Oak

### **Planning Area Goal 2: Minimize Risk and Vulnerability to Flood Hazards**

*Objective 2.1: Ensure that all future development be constructed above the 100-year flood level*

*Objective 2.2: Improve digital mapping accuracy*

*Objective 2.3: Increase drainage flow and stability on major canals*

*Objective 2.4: Preserve power supply for Gilsizer and Live Oak Canal pumps*

*Objective 2.5: Maintain duty lists and call-down phone tree numbers*

*Objective 2.6: Provide for safe and efficient collection and removal of stormwater*

## Reclamation District 1500

### **Planning Area Goal 2: Minimize Risk and Vulnerability to Flood Hazards**

*Objective 2.2: Protect the Sutter Basin during high water, specifically the Town of Robbins*

2.2.1 Provide an alternate power supply to the Karnack Pumping Plan that dewater the Sutter Basin from High Water

## Gilsizer County Drainage District

**GOAL 1: Reduce the frequency of emergency incidents**

**GOAL 2: Reduce risk from hazards**

**GOAL 3: Collect and dispose of stormwater in a safe and efficient manner**

## 5. 2 IDENTIFIED MITIGATION MEASURES AND ALTERNATIVES

In order to identify and select mitigation measures to support the mitigation goals, each hazard identified in Section 4.1 was evaluated. Only those hazards that pose a threat to the community were considered further in the development of hazard specific mitigation measures. These hazards include:

- Dam Failure
- Floods
- Wildfire
- Agricultural Hazards
- Severe Weather
  - Winterstorms: Heavy Rains/thunderstorms/Wind/Hail/Lightning

The HMPC eliminated the hazards identified below from further consideration in the development of mitigation measures, either because the risk of the hazard occurring within the Sutter County Planning Area is unlikely or non-existent or if they do occur, the vulnerability of the area is low or existing capability measures were in place to mitigate the affects of these hazards. The eliminated hazards include:

- Avalanche
- Drought
- Earthquakes
- Landslides and Rockfalls
- West Nile Virus
- Severe Weather
  - Extreme Temperatures
  - Fog
  - Snow
  - Tornadoes
- Soil Hazards
  - Erosion
  - Expansive Soils
  - Land Subsidence
- West Nile Virus
- Volcanic Eruption

It is important to note, however, that all above identified hazards are included in the County-wide Multi-Hazard Public Awareness measure.

Once it was determined which hazards warranted the development of specific mitigation measures, the HMPC analyzed a set of viable mitigation alternatives that would support identified goals and objectives. Each HMPC member was provided with the following list of categories of mitigation measures that are based on the six CRS categories:

- Prevention,
- Property Protection,
- Structural Projects,
- Natural Resource Protection,
- Emergency Services, and
- Public Information.

The HMPC members were also provided with several lists of alternative multi-hazard mitigation actions for each of the above categories. A facilitated discussion then took place to examine and analyze the alternatives. With an understanding of the alternatives, a brainstorming session was conducted to generate a list of preferred mitigation actions to be recommended.

## **Prioritization Process**

Once the initial list of mitigation actions were identified, the HMPC members were provided with several sets of decision-making tools, including FEMA's recommended STAPLE/E set, Sustainable Disaster Recovery criteria, Smart Growth principles, and "Others" to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. In accordance with the DMA requirements, an emphasis was placed on the importance of a cost-benefit analysis in determining project priority. The lists of mitigation categories, multi-hazard measures, and criteria sets are included in Appendix C.

With these criteria in mind, team members were asked to assign a High, Medium and Low priority to each mitigation action identified. After much discussion, the HMPC decidedly chose not to prioritize the recommended actions - for two reasons. First, the HMPC did not want to rank apples and oranges between communities and departments. Each community has their own recommended actions in their own section and will have to determine how to identify their own priorities. The priority assigned for each recommendation in the plan is an indication of how the project ranks in priority within the community making the recommendation. Second, the CA-OES state Hazard Mitigation Plan states their own criteria for funding local projects, so the HMPC ranking holds little weight compared to the state's. The DMA regulations state that benefit-cost is the #1 method by which projects should be prioritized. In the state ranking, the B/C criteria are one of 10, and while they do not state what their overall priority is, B/C is listed last.

Recognizing the DMA regulatory requirement to prioritize by benefit-cost and the need for any publicly funded project to be cost-effective, the HMPC decided to pursue implementation according to when and where damages occur, available funding, individual community priority, and priorities identified in the State Mitigation Plan. This process drove the development of a prioritized action plan for the Sutter County Planning Area. Cost effectiveness will be considered in additional detail when seeking FEMA mitigation grant funding for eligible projects associated with this plan.

## 5.3 THE MITIGATION STRATEGY

The results of the planning process, the risk assessment, the goal setting, the identification of mitigation measures, and the hard work of the HMPC led to the Action Plan that follows. The process also helped the HMPC clearly comprehend and identify the overall mitigation strategy that will lead to the implementation of the Action Plan. Taking all of the above into consideration, the HMPC has developed this **overall mitigation strategy**:

- **COMMUNICATE** the hazard information collected and analyzed through this planning process so that the community better understands what can happen where, and what they can do themselves to be better prepared. Also, publicize the “success stories” that are achieved through the HMPC’s ongoing efforts,
- **IMPLEMENT** the Action Plan recommendations of this plan;
- **UTILIZE** existing rules, regulations, policies and procedures already in existence. Communities can reduce future losses not only by pursuing new programs and projects, but also by more stringent attention to what’s already “on the books”. Given the flood hazard in the Planning Area, an emphasis should be placed on continued compliance with the NFIP and participation in the CRS by all communities; and
- **MOM** - ardently monitor “Multi-Objective Management” opportunities, so that funding opportunities may be shared and “packaged” and broader constituent support may be garnered.

## 5.4 MITIGATION ACTION PLAN

This Action Plan was developed to present the recommendations developed by the HMPC for how the Sutter County Planning Area can lessen the vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. The Action Plan is summarized in a table format followed by more detailed project worksheets. The Action Plan summarizes who is responsible for implementing each of the prioritized strategies determined in the previous step, as well as when and how the actions will be implemented. The recommended mitigation actions that follow are organized by jurisdiction. Each recommendation also includes a discussion of the benefit-cost to meet the regulatory requirements of DMA.

*It is important to note that the Sutter County Planning Area has numerous existing, detailed project descriptions, including cost estimates and benefits, in other planning and identified in Capital Improvement Budgets and Reports. These projects are considered to be part of this plan and the details, to avoid duplication, should be referenced in their original source document. Sutter County also realizes that new project needs and priorities may arise as a result of a disaster or other circumstances, and reserves the right to support these projects, as necessary, as long as they conform to the overall goals of this plan.*

### **Sutter County Planning Area Mitigation Action Plan**

<b>Mitigation Type and Action #</b>	<b>Mitigation Action Title</b>	<b>Priority</b>	<b>Responsible Office</b>
<b>COUNTYWIDE RECOMMENDED MITIGATION ACTIONS</b>			
<b>Emergency Services Measures</b>			
Action #1	Multi-Hazard Public Awareness Program	Medium	Sutter County OES, American Red Cross, City of Yuba City, City of Live Oak
<b>Flood Measures</b>			
Action #1	Sutter Basin Feasibility Study and Improvements	High	USACE Sacramento District, California Reclamation Board, Sutter County
Action #2	O’Banion Road DWR Pump Station Improvements	High	State Department of Water Resources
<b>Agricultural Measures</b>			
Action #3	Noxious Terrestrial Weed Control Project	High	Sutter County Department of Agriculture
Action #4	Aquatic Weed Elimination Project	High	Sutter County Department of Agriculture
<b>UNINCORPORATED SUTTER COUNTY</b>			
<b>Flood Measures</b>			
Action #1	Road Projects to Improve Right of Passage and to Decrease Localized Flooding	Medium	Sutter County Department of Public Works
Action #2	Bypass Crossing @Sacramento Ave.	Medium	Sutter County Department of Public Works
Action #3	Live Oak Canal Constriction Removal	High	Sutter County Water Agency
Action #4	Bogue Road Flood Water Diversion Berm	High	Sutter County Water Agency

Mitigation Type and Action #	Mitigation Action Title	Priority	Responsible Office
<b>CITY OF YUBA CITY</b>			
<b>Emergency Services Measures</b>			
Action #1	Emergency Communications Improvements	High	City of Yuba City Police and Fire Department
<b>Flood Measures</b>			
Action #2	Various Street Improvements to Decrease Localized Flooding	Medium	City of Yuba City Department of Public Works
Action #3	Low Lift Pump Access Road Improvements	Medium	City of Yuba City Department of Public Works
Action #4	Relocation of Wastewater Effluent Discharge Ponds	High	City of Yuba City Department of Utilities
Action #5	East and West Feather River Bank Stabilization	High	City of Yuba City Department of Utilities
Action #6	Gilsizer Slough Weir at Bogue Road	High	City of Yuba City Department of Utilities
Action #7	Comprehensive Flood Management Plan	High	City of Yuba City Department of Public Works
Action #8	Implementation of Additional CRS Activities	High	City of Yuba City Department of Public Works
Action #9	Floodplain Management Planning Outreach	High	City of Yuba City Department of Public Works
<b>Wildfire Measures</b>			
Action #10	Fire Flow Improvements for Groundwater Regions 1, 2 and 3	Medium	City of Yuba City Department of Utilities
<b>CITY OF LIVE OAK</b>			
<b>Flood Measures</b>			
Action #1	Road Projects to Improve Right of Passage and to Decrease Localized Flooding	Medium	City of Live Oak Department of Public Works
Action #2	Lift Pump Back Up Generator Improvements	Medium	City of Live Oak Department of Public Works
<b>GILSIZER COUNTY DRAINAGE DISTRICT</b>			
<b>Flood Measures</b>			
Action #1	Revetment of Slough Channel/Headwalls at Road Crossing	High	Gilsizer County Drainage District

Mitigation Type and Action #	Mitigation Action Title	Priority	Responsible Office
<b>LEVEE DISTRICT ONE</b>			
<b>Flood Measures</b>			
Action #1	Bank Erosion Repairs To Levees in Several Areas	Medium - High	Levee District One
Action #2	Star Bend Set Back Levee	High	Levee District One
Action #3	Relief Well Location (N. Star Bend)	High	Levee District One
<b>RECLAMATION DISTRICT 1001</b>			
<b>Flood Measures</b>			
Action #1	Unit 2 LB Yankee Slough Levee Repairs	Medium	RD1001
Action #2	Feather River/Sacramento River Landslide Stability Berm	High	RD1001
Action #3	North Levee of Natomas Cross Canal Repairs	Medium	RD1001
Action #4	Infrastructure Improvements – District-wide and Main Pumping Facility	High	RD1001
<b>RECLAMATION DISTRICT 1500</b>			
<b>Flood Measures</b>			
Action #1	Karnak Pump Plant Renovation	High	RD1500
<b>RECLAMATION DISTRICT 70</b>			
<b>Flood Measures</b>			
Action #1	Pumping Plant Project	Medium	RD70
<b>RECLAMATION DISTRICT 1660</b>			
<b>Flood Measures</b>			
<b>Action #1</b>	Sutter By-Pass Project	High	RD1660

# SUTTER COUNTY PLANNING AREA: COUNTYWIDE RECOMMENDED MITIGATION ACTIONS

## EMERGENCY SERVICES MITIGATION ACTIONS

### **ACTION #1: DEVELOP AND CONDUCT A MULTI-HAZARD SEASONAL PUBLIC AWARENESS PROGRAM PROVIDING CITIZENS AND BUSINESS WITH ACCURATE INFORMATION DESCRIBING RISK AND VULNERABILITY TO NATURAL HAZARDS, IMPLEMENTED ON AN ANNUAL BASIS**

**Issue/Background:** Sutter County is subject to several natural hazards, each which pose a different degree of risk and associated vulnerability. Some hazards have a combination of attributes, including a high likelihood of occurrence, a specific location that would likely be impacted, and proven approaches that can reduce the impact, such that the HMPC has recommended specific actions be taken. For other hazards, where either the likelihood of occurrence is very low, or the area of likely impact is not specifically known, or there is very little that can be done to reduce the impacts, the HMPC has determined that the best approach would simply be public awareness. People should know what the HMPC knows: information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions to save lives and minimize property damage and where additional information can be found. Any information provided through this effort should be accurate, specific, timely and consistent with current and accepted local emergency management procedures as promoted by the California State Office of Emergency Services, and the American Red Cross. This public outreach effort should include the following elements:

- Utilize a variety of information outlets including local news media, creating and printing of brochures and leaflets, water bill inserts, websites and public service announcements. Current brochures and flyers should be put on display in county and city office buildings, libraries and other public places.
- Develop public-private partnerships and incentives to support public education activities.

**Other Alternatives:** Continue public information activities currently in place

**Responsible Office:** Sutter County Office of Emergency Services, American Red Cross, Chamber of Commerce, City of Yuba City, City of Live Oak

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$5-20,000 annually depending upon printing and mailing costs, level of volunteer participation, and scope and frequency of events.

**Benefits (avoided Losses):** Life safety, reduction in property losses, relatively low cost.

**Potential funding:** HMPG, PDM, Sutter County Funds

**Schedule:** Part of seasonal multi-hazard public awareness campaign

## **FLOOD MITIGATION ACTIONS**

### **ACTION #2: SUTTER BASIN FEASIBILITY STUDY AND IMPROVEMENTS**

**Issue/Background:** The Corps of Engineers has initiated a feasibility study to identify measures for flood damage reduction, ecosystem restoration, and recreation in the Sutter Basin Feasibility Study Area. The Study Area includes the Sutter Bypass-Feather River Basin and the Sutter Basin. This study was initiated, in part, as a result of geotechnical and hydraulic analyses conducted by the Corps which found that the existing Feather River and Sutter Bypass levees have less than 100-year level of flood protection as originally assumed. Initial studies of this area began in 1999. Currently, the major study scope is focused on providing major flood damage reduction to the urban areas of Yuba City and Live Oak and developing flood warning coordination plans for outlying areas. Other project objectives include ecosystem restoration and recreation. The overall objective of the Study is to restore the levee system to a 100-year level of protection (Phase I) and then increase to a 200-year or higher level of protection (Phase II). This Feasibility Study, which will include an EIS/EIR component will result in one or more construction projects.

As of October 2006, 20 measures were retained for further study and combined into 24 different alternatives for further evaluation. The 20 measures retained included a wide variety of solutions from the following categories:

- Flood Damage Reduction – Nonstructural Measures
- Flood Damage Reduction – Structural Measures
- Flood Damage Reduction – Reservoir Reoperation
- Ecosystem Restoration Measures
- Recreation Measures

Once the study is complete, the preferred alternative will be designed and constructed. For more details on this study, the Corps of Engineers is producing a variety of documents which should be referred to.

(Source: Sutter Basin Feasibility Study, October 2006)

**Other Alternatives:** All alternatives are being evaluated.

**Responsible Office:** US Army Corps of Engineers, Sacramento District; State of California, Reclamation Board, Sutter County

**Priority (High, Medium, Low):** High

**Cost Estimate:** Feasibility Study: \$11,000,000  
Preferred Alternative Implementation: Project costs will depend on alternative selected.

**Benefits (avoided Losses):** Life-Safety, Property Protection, Preservation of Economic Vitality of Planning Area. A 905(B) analysis of the water resource related problems and potential solutions conducted by the Corps in July of 1999 revealed the following findings:

- Several miles of levees along the Feather River upstream of Yuba City protect close to 30,000 residential home, 1500 commercial structures, 620 farm house and buildings, and 120 semi-public structures from devastating floods. The estimated value of the structures and contents at risk was determined to be in excess of \$5 billion. This has since drastically increase as evidenced by the flood – assets at risk analysis included in this plan.
- “A flood damage reduction project will enhance the public health, safety and welfare by eliminating damages to single family residences, interruptions to interstate commerce and reducing the impacts to agriculture thereby promoting a safe environment for the residents of Sutter County and the economy throughout California and the surrounding areas”

**Potential funding:** Federal Appropriations and Grants, State Funds & Grants, Local Funds

**Schedule:** Feasibility Study: 2006-2009  
Phase 1 Design, EIR, R/W: 2007-2010  
Phase 1 Construction: 2010-2012  
Phase 2 Design, EIS, R/W: 2009-2012  
Phase 2 Construction: 2012-????

### **ACTION #3: O'BANION ROAD DWR PUMP STATION IMPROVEMENTS**

**Issue/Background:** This DWR pump station is responsible for moving the water from the Gilsizer Slough and Live Oak Canal into the Sutter Bypass. If this water is not sufficiently pumped over the levee into the Sutter Bypass during a storm, flood waters will back up into Yuba City and cause flood damage. Improvements need to be made to the pump station to ensure continued operations during flood events.

**Other Alternatives:** No Action

**Responsible Office:** State Department of Water Resources

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$2.5 million

**Benefits (avoided Losses):** Life safety and property loss (including agricultural, public and private)

**Potential funding:** HMPG, PDM, FMA, State and Local Funds

**Schedule:** Part of seasonal multi-hazard public awareness campaign

## **AGRICULTURAL MITIGATION ACTIONS**

### **ACTION #4: NOXIOUS TERRESTRIAL WEED CONTROL PROJECT**

**Issue/Background:** Noxious weeds are any species of non-native plants which are detrimental to agriculture, threaten public safety or displace native species. They are often difficult to eradicate due to their aggressive nature and lack of natural controls. The Yuba/Sutter Weed Management Area was created to bring public and private stakeholders together to consolidate efforts to detect, control, suppress and eradicate noxious weeds. The group used AB 1740 funds to create an informational brochure entitled “Yuba/Sutter Weed Management Area’s Dirty Dozen,” a list of weeds of special concern in our area. Some of the listed dozen are of particular concern and, as such, are the focus of this project:

**Yellow Starthistle**, *Centaurea solstitialis*, infests cultivated fields, pastures and wastelands. It causes “Chewing disease” in horses and decreases infested rangeland’s grazing capacity.

**Saltcedar**, *Tamarix ramosissima*, an escaped ornamental inhabits streamside areas, canals and reservoirs and disrupts the structure and stability of native plant communities, degrading native wildlife habitat by outcompeting and replacing native plant species, monopolizing limited sources of moisture, and increasing the frequency, intensity and effect of fires and floods.

**Puncturevine**, *Tribulus terrestris*, is a low-growing weed with sharp seeds capable of, as the name implies, puncturing tires. It invades cultivated fields, roadsides, yards, fencerows, and walkways. Its seed can remain dormant in the soil for four to five years, making eradication difficult.

**Himalaya Blackberry**, *Rubus discolor*, thrives along ditchbanks and riversides and is becoming a troublesome, persistent weed in orchards, vineyards and forests. It may grow to several meters in height and its thorny canes impede access and make removal difficult.

**Rush Skeletonweed**, *Chondrilla juncea*, a Eurasian species infesting roadsides, rangelands, grain fields, and pastures. The extensive root systems mean it can outcompete native rangeland plants and also make control extremely difficult.

**Perennial Pepperweed**, *Lepidium latifolium*, distributed along roadsides, ditchbanks, fencerows, and waste areas. May become a pest in orchards and cultivated annual crops.

**Johnsongrass**, *Sorghum halapense*, may grow to 8 feet tall and obstruct roadways and intersection visibility. May be toxic to livestock.

**Russian Thistle**, *Salsola iberica*, Also known as tumbleweeds, mature plants break off and may drift across roadways, obscuring visibility. Found in disturbed areas, may be found in cropland.

**Responsible Office:** Sutter County Department of Agriculture

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$75,000/year for management to upwards of \$1M for complete eradication of a single species

**Potential Losses:** Loss of wildlife habitat and reduced wildlife population  
Loss of native plant species  
Reduced Livestock grazing capacity  
Increased soil erosion and topsoil loss  
Diminished water quality and fish habitat  
Reduced cropland and farmland production  
Reduced land value  
Public safety hazard due to decreased roadway visibility

**Potential funding:** Limited County, State and Federal Funds

**Schedule:** Continuous monitoring for prevalence of these species. Eradication/management projects as funding allows.

## **ACTION #5: AQUATIC WEED ELIMINATION PROJECT**

**Issue/Background:** Agriculture is the economic base of Sutter County. The irrigation and drainage canal system that supports the county's croplands covers approximately 1,300 miles<sup>1</sup>. Many of these canals and natural waterways throughout the county are already infested with **Parrotfeather**, *Myriophyllum aquaticum*, and **Water primrose**, *Ludwigia* complex, two highly invasive, noxious aquatic weeds. It is estimated that Parrotfeather infests more than 50 miles of Sutter County waterways and Water Primrose more than 60<sup>2</sup> miles. These weeds root and grow between the ditchbanks, building thick, impenetrable mats and causing the water to be carried higher in the ditch. This displaced water increases the risk of bank failure and subsequent flooding. These aquatic weeds also clog irrigation pumps and impede the movement of water, reducing the ability to drain arable lands and remove flood waters away from urban areas. In natural water systems, they out-compete natural vegetation. Natural enemies of Mosquito larvae may be excluded by the thick mass of vegetation and roots, leading to an upsurge in the Mosquito population.

**Giant Reed**, *Arundo donax*, is often found growing on the ditchbanks to several meters in height. It creates a problem when the water undercuts its dense root masses and the weed (and ditchbank) fall into the water. **Arundo** has been known to obstruct culverts and cause flooding. Sutter County has approximately 23 miles of *Arundo* infesting its water conveyance systems.

These drainage systems are controlled by a myriad of public agencies including drainage districts, reclamation districts and irrigation districts. These agencies have had difficulty with treating the aquatic weed infestations and often have reactionary strategies (mechanical removal), which cause temporary relief of the infestation, but lead to further problems such as ditchbank sloughing and downstream infestations. For any project to have success, it must be at least countywide, as reinfestation will be swift otherwise. Ideally, the project would be conducted in conjunction with Sutter County's upstream neighbors (Butte County, Placer County), eliminating the weeds in the entire watershed.

**Responsible Office:** Sutter County Department of Agriculture

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$75,000/year for management to upwards of \$1M for complete eradication of a single species.

**Benefits (avoided Losses):** Averted damage to grower's irrigation equipment; significantly reduced risk of flooding due to ditchbank failure and water conveyance system blockage; increased biological diversity in natural areas.

**Potential funding:** Limited County, State and Federal Funds

**Schedule:** Any elimination efforts must be sustained over several years to have significant effect. Immediate eradication of some species is not possible due to water holding requirements of certain aquatic herbicides. Treatment strategies may be affected by water use objectives and the controlling agency.

#### **Footnotes**

<sup>1</sup> 1357 miles-Census 2000 TIGER/Line Data. Currently, a coordinated project is underway between Ducks Unlimited and Sutter County Department of Agriculture to improve the accuracy of the aquatic data layers (GIS) used by public agencies to perform risk assessments such as this.

<sup>2</sup> Parrotfeather (50.89 miles), Water primrose (62.16 miles), Arundo (23.7 miles). Reliability of data is tied to survey thoroughness. Not all 1357 miles of Sutter County waterways have been surveyed, so total infestation could be considerably higher than given figures, but are unlikely to be any less.

# UNINCORPORATED SUTTER COUNTY RECOMMENDED MITIGATION ACTIONS

## FLOOD MITIGATION ACTIONS

### **ACTION #1: VARIOUS ROAD PROJECTS TO IMPROVE RIGHT OF PASSAGE AND TO DECREASE LOCALIZED FLOODING**

**Issue/Background:** Localized flooding throughout the County occurs during storm events due to lack of drainage capacities. Drainage problems have arisen, due to an increase in the requested capacity of these systems from less wettable surface areas (i.e., areas where there were orchards or farm land that could soak the water into the ground.) This has been due to area growth have been that has led to localized flooding of streets and low lying properties. The existing infrastructure of the Live Oak Canal is not sized to provide adequate drainage when surrounding areas were developed.

**Other Alternatives:** No Action - Continue to allow localized flooding during storm events

**Responsible Office:** County of Sutter Public Works Director

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$3 million

**Benefits (avoided Losses):** Reduce damage to homes and property loss. Reduce the possibility of safety hazards associated with flooded streets, public property, and systems.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds; Private Funds

**Schedule:** 3-5 years

### **ACTION #2: BYPASS CROSSING @ SACRAMENTO AVE.**

**Issue/Background:** Due to high water events within the levees of the Sacramento River the Bypass takes water from the river at a set level and diverts the water through the Bypass to alleviate some of the pressure on the Sacramento River Levees. This leads to several county roads that traverse the Bypass being closed for the time that the rivers continue to flow at this capacity. Multiple times a year county maintenance crews must repair the road after the water subsides to provide safe access for farmers and commuters that use these thoroughfares daily. Project scope would include providing concrete box culverts under the roadway to prevent washouts. A lime treatment on the sub soils, a rock and rip rap barrier on the north and south sides of the roadway to prevent under washing of the base rock. Overlay the Area with 1/2 AC material.

**Other Alternatives:** No Action

**Responsible Office:** County of Sutter Public Works Director

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$2 million

**Benefits (avoided Losses):** By maintaining the roadway with this type of preventive maintenance, the county will be able to reduce costs associated with maintaining and repairing the roadway after each high water event. These events can and have occurred several times during each winter season.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds; Private Funds

**Schedule:** 3-5 years

### **ACTION #3: LIVE OAK CANAL CONSTRICTION REMOVAL**

**Issue/Background:** The Live Oak Canal is a county maintained interior drainage canal supporting west Yuba City and county area within the Yuba City sphere of influence. Its capacity is hampered by undersized pipes and culverts at numerous road intersections.

**Other Alternatives:** Restrict additional flows to the canal.  
Enlarge canal.  
Construct connecting detention ponds.

**Responsible Office:** Sutter County Water Agency

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$150,000

**Benefits (avoided Losses):** Prevent canal overflow and local drainage back up. Roadway and landscape damage in city subdivisions. First floor structural and water damage to facilities/residences in county areas. Costs estimated in excess of three million dollars.

**Potential funding:** Water Agency assessments, HMGP, PDM, FMA; Local Funds

**Schedule:** Five locations have been designed for culvert/pipe replacement. Construction start not yet determined, but estimated in the next 1-3 years.

#### **ACTION #4: BOGUE ROAD FLOOD WATER DIVERSION BERM**

**Issue/Background:** Inundation studies for the Yuba City Basin (Levee breaks on both the Sutter Bypass and Feather River) indicate a slow rise of flood water filling the basin to the south of Yuba City and eventually inundating by several feet of water, populated areas north of Bogue Road (southern boundary of Yuba City sphere of influence). A diversion earthen berm approximately four feet in height could contain the flood waters to the southern portion of the Basin. Numerous openings would have to be provided for traffic circulation and interior drainage (Gilsizer). This would require gate structures or emergency closure means. The berm length is estimated at six miles with possibly as many as 30 openings.

**Other Alternatives:** Diversion ditches to new pumping facilities at the Sutter Bypass.  
Elevate hundreds of structures.  
Install an overflow weir at the south end of Basin.

**Responsible Office:** Sutter County Water Agency

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$2.5 million

**Benefits (avoided Losses):** Flood damage to land crops and residences north of Bogue Road.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants, Local Funds

**Schedule:** Feasibility Study ongoing.

# CITY OF YUBA CITY RECOMMENDED MITIGATION ACTIONS

## EMERGENCY SERVICES MITIGATION ACTION

### **ACTION #1: EMERGENCY COMMUNICATION IMPROVEMENTS**

**Issue/Background:** Currently, there are some areas countywide that do not have radio signals. During an emergency, additional resources are needed to communicate within these areas. This usually involves additional people to act as relays across these areas. Additional communication structures need to be established.

**Other Alternatives:** No Action

**Responsible Office:** City of Yuba City Police and Fire Department

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$1-2 million

**Benefits (avoided Losses):** Life safety, Property loss

**Potential funding:** Federal and state funding/grants, Local Funds – CIP budgets,

**Schedule:** 2008 to 2011

## FLOOD MITIGATION ACTIONS

### **ACTION #2: VARIOUS STREETS: PROJECT IMPROVEMENTS TO DECREASE LOCALIZED FLOODING**

**Issue/Background:** Localized flooding throughout the city occurs during storm events due to lack of infrastructure and drainage problems. As the City has grown and annexed rural areas, drainage problems have arisen that have led to localized flooding of streets and low lying property. The existing infrastructure in critical areas either does not exist or is not sized to provide adequate drainage when surrounding areas were developed.

See the “City of Yuba City Recommended Drainage Improvement Areas” on page 212 for project areas as well as projects identified in the City’s 2007 Capital Improvement Program.

**Other Alternatives:** Continue to allow localized flooding during storm events

**Responsible Office:** City of Yuba City Public Works Director

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$10 million

**Benefits (avoided Losses):** Reduce damage to homeowners and property loss. Reduce the possibility of safety hazards associated with flooded streets, public property, and systems. Prevent oils and foreign material from entering waterways and groundwater. Labor and associated costs of cleaning up after flooding would be reduced or eliminated

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds; Private Funds

**Schedule:** 1-5 years depending on funding; localized flooding projects are budgeted for annually.

### **ACTION #3: LOW LIFT PUMP ACCESS ROAD IMPROVEMENTS**

**Issue/Background:** Due to high water events within the levees of the Feather River the access road to the City of Yuba City's low lift intake structure becomes impassable by vehicle. Water rises and washes out the roadway at existing culverts multiple times a year creating access and maintenance problems. The low lift pump must be checked two times a day for proper operation. A majority of the City of Yuba City's water supply is taken in at this site. Multiple times a year maintenance crews must repair the travel way to provide access for water operators and maintenance workers to check and serve the intake pump daily. Project scope would include providing concrete box culverts under the roadway to prevent washouts.

See the "City of Yuba City Localized Flooding Map" for project area location

**Other Alternatives:** Relocate Pump

**Responsible Office:** City of Yuba City Public Works Director

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$1 million

**Benefits (avoided Losses):** By maintaining access to Low Lift Pump, which provides water for the City of Yuba City residents, the possibility of pump problems and water shortages if failure occurred are greatly reduced. Reduce costs associated with maintaining and repairing the roadway.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds; Private Funds

**Schedule:** 3-5 years

#### **ACTION #4: RELOCATION OF WASTEWATER EFFLUENT DISCHARGE PONDS**

**Issue/Background:** During the 1986, 1996, and 2006 storm events, major storm damage occurred to the six wastewater effluent ponds. Damage that occurred included erosion of access roads, damage to concrete spillway structures, deposition of soil into the ponds, and damage to existing riprap. FEMA and OES have funded reconstruction of the ponds after each of the three storm events. This project entails moving the ponds out of the floodway onto the landside of the floodway either on the east or west side of the Feather River.

**Other Alternatives:** No Action

**Responsible Office:** City of Yuba City Department of Utilities

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$20 million

**Benefits (avoided Losses):** Future mitigation and reconstruction costs of rebuilding the ponds after a major storm event.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds

**Schedule:** 1-5 years as funding is available

#### **ACTION #5: EAST AND WEST FEATHER RIVER BANK STABILIZATION**

**Issue/Background:** The Feather River floodway between Yuba City and Marysville is bounded by east and west levee structures. However, within the floodway, the main Feather River has eroded its banks in two areas accessed by Yuba City. One area is on the west side of the wastewater effluent ponds and another area is on the east side of the water supply intake access road. This project entails installing rip rap and stabilizing the river bank.

**Other Alternatives:** Relocating water supply access road and wastewater effluent ponds.  
No Action

**Responsible Office:** City of Yuba City Department of Utilities

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$1-2 million

**Benefits (avoided Losses):** Property damage – Adequate bank stabilization would avoid the need to relocate water supply access road and wastewater effluent ponds.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds

**Schedule:** 1-5 years as funding is available

**ACTION #6: GILSIZER SLOUGH WEIR AT BOGUE ROAD**

**Issue/Background:** Gilsizer Slough is the main channel which runs through Yuba City transferring the drainage runoff generated by the majority of the City to the Sutter By-Pass. In the flood of 1955, the flood water backed into the City through the Gilsizer Slough flooding several properties. In order to prevent such occurrences from happening in the future, the slough will need to be “blocked” in case of a levee break in the Yuba City Basin. Blocking the slough cannot be achieved after a break occurs because of the time it will take to construct a structure to block the slough. Constructing a weir that blocks the natural channel of the Gilsizer Slough will provide a structure in place to be utilized in preventing the flood water from backing into the city caused by a levee break.

**Other Alternatives:** No Action

**Responsible Office:** City of Yuba City Public Works Department

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$3 million

**Benefits (avoided Losses):** The backing up of flood water into Yuba City would cause billions of dollars in damage to properties and economic impacts to the entire Planning Area.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds

**Schedule:** 1-5 years as funding is available

**ACTION #7: COMPREHENSIVE FLOOD MANAGEMENT PLAN**

**Issue/Background:** Yuba City has completed a risk assessment for the city within the Multi-Hazard Mitigation Plan and needs to develop a comprehensive flood management plan that includes an assessment of existing data, future data needed, and projects to provide 200-year level of flood protection for the city.

**Other Alternatives:** No Action

**Responsible Office:** City of Yuba City Department of Public Works

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$1 million

**Benefits (avoided Losses):** Life Safety, Property damage

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds

**Schedule:** 1-3 years

#### **ACTION #8: IMPLEMENTATION OF ADDITIONAL CRS ACTIVITIES**

**Issue/Background:** The CRS program reduces the flood insurance premiums for city residents. The City has qualified for a Level 8 that provides a 5% discount for preferred insurance customers and 10% for mandatory flood insurance customers. The City can work towards a Level 1 that would reduce mandatory flood insurance by 45% and reduce preferred insurance rates to 10%. Funding and implementing additional activities will allow the City to increase their rating.

**Other Alternatives:** No Action

**Responsible Office:** City of Yuba City Department of Public Works

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$500 thousand to \$1.5 million

**Benefits (avoided Losses):** Life Safety, Property damage

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds

**Schedule:** 1-3 years

#### **ACTION #9: FLOODPLAIN MANAGEMENT PLANNING OUTREACH PROJECT**

**Issue/Background:** Outreach to the community is essential during development of a comprehensive flood management plan. The outreach will be conducted and input used during development and implementation of the plan.

**Other Alternatives:** No Action

**Responsible Office:** City of Yuba City Department of Public Works

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$250 thousand to \$1 million

**Benefits (avoided Losses):** Life Safety, Property damage

**Potential funding:** Local Funds – CIP budgets, federal and state grants

**Schedule:** 2007 to 2010

## **WILDFIRE MITIGATION ACTIONS**

### **ACTION #10: FIRE FLOW IMPROVEMENTS FOR GROUNDWATER REGIONS 1,2, AND 3 INCLUDING AREAS SERVED BY SURFACE WATER.**

**Issue/Background:** These regions were annexed from the county and do not meet city standards to meet fire flows and provide adequate water pressure.

**Other Alternatives:** No Action

**Responsible Office:** City of Yuba City Department of Utilities

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$25 million

**Benefits (avoided Losses):** Life safety, Property loss

**Potential funding:** Federal and state funding, Local Funds – CIP budgets, Grant funds

**Schedule:** Future project 2013 contingent on funding.

# CITY OF LIVE OAK RECOMMENDED MITIGATION ACTIONS

## FLOOD MITIGATION ACTIONS

### **ACTION #1: VARIOUS ROAD PROJECTS TO IMPROVE RIGHT OF PASSAGE AND TO DECREASE LOCALIZED FLOODING**

**Issue/Background:** Localized flooding at various locations in the City occurs during storm events due to lack of drainage capacities. Drainage problems have arisen, due to a lack of storm drainage infrastructure such as curbs, gutters and sidewalks on many older streets. As the City transitions from a semi-rural setting to an urban one, the older, less developed areas drainage problems are more apparent. The existing infrastructure of Live Oak is not sized to provide adequate drainage when surrounding areas are developed.

**Other Alternatives:** No Action - Continue to allow localized flooding during storm events

**Responsible Office:** Live Oak Public Works Director

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$3-5 million

**Benefits (avoided Losses):** Reduce damage to homes and property loss. Reduce the possibility of safety hazards associated with flooded streets, public property, and systems.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds; Private Funds

**Schedule:** 5-7 years

### **ACTION #2: LIFT PUMP BACK UP GENERATOR IMPROVEMENTS**

**Issue/Background:** Due to high water events within the City of Live Oak, the lift pump must be checked at least two times a day for proper operation. If there is a power failure, water will not be pumped out of the stations resulting in localized flooding. Water operators and maintenance workers must check and serve the intake pump daily when in use. Project scope would include providing back up generators on multiple sites and/or portable generators that could be used when mechanical problems incapacitate an existing generator.

**Other Alternatives:** Allow localized flooding

**Responsible Office:** Live Oak Public Works Director

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$400,000

**Benefits (avoided Losses):** Reduce damage to homes and property loss. Reduce the possibility of safety hazards associated with flooded streets, public property, and systems.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds; Private Funds

**Schedule:** 3-5 years

# SUTTER COUNTY DISTRICTS RECOMMENDED MITIGATION ACTIONS

## FLOOD MITIGATION ACTIONS

### GILSIZER COUNTY DRAINAGE DISTRICT

#### **ACTION #1: REVETMENT OF SLOUGH CHANNEL/HEADWALLS AT ROAD CROSSINGS**

**Issue/Background:** During periods of highwater, high-velocity water in slough causes ditch erosion and bank failure. This project proposes using an interlocking concrete block system to prevent future bank erosion and failure.

**Other Alternatives:** Concrete ditch banks/Box culverts at public road crossings.

**Responsible Office:** Gilsizer County Drainage District

**Priority (High, Medium, Low):** High

**Cost Estimate:** To be determined.

**Benefits:** Prevent future erosion to levee slope. Reduce risk of flooding thereby reducing damage to homeowners and property loss.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds

**Schedule:** 1-5 years

## LEVEE DISTRICT ONE

### **ACTION #1: BANK EROSION REPAIRS TO LEVEES IN SEVERAL AREAS:**

- **AREA 1: 1/5 MILE SOUTH OF BOYDES PUMP BOAT RAMP**
- **AREA 2: ONE MILE SOUTH OF STEWART ROAD**
- **AREA 3: BEHIND COURTHOUSE BUILDING IN YUBA CITY**

**Issue/Background:** High water and rapid flows have caused erosion of the levee slope in several areas. In Area 1, the river has eroded into the toe of the levee. In Area 2, the river has eroded into the bank close to the toe of the levee for about ¼ of a mile. In both of these areas, the district is working with the USACE and the state to rock the bank along the eroded areas. In Area 3, the river has been eroding into the levee over the years, now causing significant concern. The District is working with the USACE and the state to rebuild the levee toe and then rocking the bank.

**Other Alternatives:** Leave as is and monitor.

**Responsible Office:** Levee District One

**Priority (High, Medium, Low):** Medium-High

**Cost Estimate:** Area 1: \$3 million  
Area 2: \$2 million  
Area 3: \$5 million

**Benefits:** Life Safety and property loss. Prevent future erosion to levee slope and limit potential for a levee breaks in these areas. Should a break occur in the area behind the courthouse, downtown Yuba City would be inundated.

**Potential funding:** USACE, State DWR, HMGP, PDM, FMA; Local Funds

**Schedule:** 1-3 years

### **ACTION #2: STAR BEND SET BACK LEVEE**

**Issue/Background:** The Star Bend area of the levee has been an ongoing concern to the levee district due to the sharp bend in the levee combined with an under seepage problem. A grant is being applied for from the State's Proposition 1-E funds to build a set back levee. The funds have been set aside for this project.

**Other Alternatives:** Repair old levee in place and monitor the pressure on the levee

**Responsible Office:** Levee District One

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$20 million

**Benefits:** Life Safety and property loss. Should a break occur in this area, ½ of the Yuba City Bowl would be under water.

**Potential funding:** State Prop. 1-E: \$17 million  
Local Share: \$3 million

**Schedule:** 1-3 years

### **ACTION #3: RELIEF WELL LOCATION (N. STAR BEND)**

**Issue/Background:** An area of heavy under seepage that was repaired by the USACE (1997) is again of concern. The relief wells in this area failed to work during the high water of 2006 allowing boils to occur. The District is currently working with the USACE, State Reclamation Board, and locals to identify the best solution. The best solution likely includes construction of a slurry wall in place of the relief wells.

**Other Alternatives:** Construct a set back levee (although, likely not feasible)

**Responsible Office:** Levee District One

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$10 million

**Benefits:** Life Safety and property loss. Should a break occur in this area, ½ of the Yuba City Bowl would be under water.

**Potential funding:** USACE, State DWR, HMGP, PDM, FMA; Local Funds

**Schedule:** 1 year

## RECLAMATION DISTRICT 1001

### **ACTION #1: UNIT 2 LB YANKEE SLOUGH LEVEE REPAIRS EAST OF SWANSON ROAD**

**Issue/Background:** High water and rapid flows in the Yankee Slough have caused erosion of the levee slope. High water of 2005/2006 worsened erosion of levee slope whereby cutting into the slope of the levee. PL 84-89 repairs to be fixed to predisaster design are Order 3.

**Other Alternatives:** Excavate areas of erosion, replace material lost and place large rock revetment to keep bank from further erosion.

**Responsible Office:** Reclamation District 1001

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$1 million

**Benefits:** Prevent future erosion to levee slope. Reduce risk of flooding thereby reducing damage to homeowners and property loss.

**Potential funding:** HMGP, PDM, FMA; State Funds & Grants; Local Funds; Private Funds

**Schedule:** 2008-2009

### **ACTION #2: FEATHER RIVER/SACRAMENTO RIVER LANDSLIDE STABILITY BERM**

**Issue/Background:** Frequent flooding characterized by large flows has plagued the Sacramento River Basin which includes the left bank of the Feather and Sacramento Rivers in Reclamation District 1001. In order to reduce flood risk due to under seepage, studies were conducted on ways to prevent seepage from undermining the levee structure. In 1996 Mid Valley Levee Rehab Phase III started the process through analysis of the system to develop a project design. Numerous projects were considered with the final design as a landside seepage berm four feet high. ( 4 areas totaling 6,410LF)

**Other Alternatives:** deep slurry wall, landside toe drain

**Responsible Office:** Reclamation District 1001

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$6 ½ million

**Benefits:** Landside berm would provide the necessary stability for the levee. Reduce the risk of flooding from under seepage-issues. Reduce damage to homeowners and property loss caused by flooding

**Potential funding:** State Funds (Bond), Grants and Local Funds  
Mid Valley Levee Rehab Phase III Funding (if reinstated)

**Schedule:** Project design is in place needing final environmental assessment and funding.

### **ACTION #3: NORTH LEVEE OF NATOMAS CROSS CANAL REPAIRS**

**Issue/Background:** Due to high water, heavy rains and severe winds in January 2006, the north levee of the Natomas Cross began to erode from wave wash action. Emergency wave wash repairs were done by the placing of sand bags and plastic on the damaged portion of the levee to prevent further damage.

There was similar wave wash damage from the storms 1996/97. Corp fixed damage hauling in material and compacting it in place only to fail again.

**Other Alternatives:** Reshape landside slope and place a rock layer (10" - 12" minus) to prevent this type of erosion in the future.

**Responsible Office:** Reclamation District 1001

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** TBD

**Benefits:** Prevent future damage from wave wash. Maintain the integrity of the levee to prevent flooding and loss to homeowners and property.

**Potential funding:** State Bond Funds; Grants: PDM, HMGP, FMA; Local Funds

**Schedule:** 2008-2009

### **ACTION #4: INFRASTRUCTURE IMPROVEMENTS - DISTRICT-WIDE AND MAIN PUMPING FACILITY**

**Issue/Background:** District's infrastructure is very old. The main pumping plant was constructed in the early 1900s along with most of the pipelines for drainage. RD 1001 staff is currently undertaking a flood control system-wide analysis of needed repair and/or replacement of essential infrastructure. (i.e., Main pump facility & pipes that facilitate drainage of District's 32,000 acres.)

Internal inspection of pipelines will be needed, possibly using closed circuit television inspection equipment. Repairs to the inspected pipelines could be achieved using the following methods:

- 1) Plastic pipe insert supported by grout substance.
- 2) Cured in-place- pipe application.

**Other Alternatives:** Removal and replacement of pipes by excavating portions of the levee to remove and replace pipe; thereby possibly disturbing the environment.

**Responsible Office:** Reclamation District 1001

**Priority (High, Medium, Low):** High

**Cost Estimate:** TBD

**Benefits:** Avoid loss due to flooding of drainage pipe and pump facility failure.

**Potential funding:** Grants: PDM, HMGP, FMA; Local Funds: RD1001 Operation and Maintenance Assessments

**Schedule:** 2007-2009

### ACTION #1: KARNAK PUMP PLANT RENOVATION



**Karnak Pump Plant**

**Issue/Background:** Karnak Pump Plant 1 was built in 1914. It consisted of 6- 800 horsepower 50” centrifugal pumps, housed in a block building. In 1952 Pump Plant 3 was built. It consisted of 4- 700 horsepower 48” vertical pumps and is housed in a steel building next to pump plant 1. The pumps and electrical equipment have been maintained, upgraded and modernized as money is available and wear and tear dictates.

The plant has a single source of commercial electrical power, that being from PG&E. The power is supplied from a transfer station south of Knights Landing California. The main power supply lines come from two directions into this transfer station then is routed overhead across the Sacramento River to our pumping station at Karnak. We are very vulnerable to power interruptions. In 1997 the power coming into the transfer station south of Knights Landing failed and our pump plant was without power for approximately six hours causing flooding in the town of Robbins. The water covered the streets and was at the foundations of many homes. During the winter of 2005/06 there was a power interruption causing high voltage on one side of the Sacramento River and low voltage on our side of the River. This low voltage situation cost the

District over \$100,000 in damages to the electrical system. Because of the overhead power lines, power can be interrupted for various reasons such as high winds knocking down the power lines or poles, electrical storms knocking out power switches or various problems relating to PG&E's operations. Over the years the District has had close calls with all these types of problems. Due to the fact that there is only one source of power from south of Knights Landing to our pumping plants at Karnak, which is about 5 miles away if anything happens and these power lines fail our pumps will stop. If this failure is during a critical storm such as last winter, then the entire town of Robbins, California, Highway 113, and surrounding agriculture farmland and farm industry support facilities will be at great risk of flooding.

An alternative power supply would make the system more stable and prevent potentially severe flooding impacts as a result of loss of power.



### **Power Leading to Karnak**

**Other alternatives:** No Action

**Responsible Office:** RD1500

**Priority (High, Medium, Low):** High

**Cost Estimate:** To be determined

**Benefit:** Life safety, reduction in economic and property impacts.

Sutter Basin is surrounded by levees maintained and monitored by Reclamation District 1500. All water coming into this Basin must be pumped or gravity feed out. During high water, the release of water at Oroville Dam and high Feather River water flows will not allow for gravity feed so that all water must be pumped out of the basin. If the pumps at Karnak fail, then flooding in the south end of the District will start immediately; and within 4 to 6 hours water will be in the Sutter Basin Growers Co-Op and the town of Robbins. The Co-Op's approximate annual revenue to its growers is 22 million dollars with assets valued at about 15 million dollars. Flooding the town of Robbins would cause considerable damage to its 100 residents, school and businesses. If flooding occurs in the Basin, then Hwy 113 a major north-south transportation route from Yuba City south, with a bridge over the Sutter Bypass, could close, which in the 1997 storm and flood events was one of the few emergency routes out of Yuba City that remained opened.

**Potential funding:** PDM, HMGP, FMA

**Schedule:** To be determined.

## RECLAMATION DISTRICT 70

### **ACTION #1: PUMPING PLANT PROJECT**

**Issue/Background:** During times of heavy storms and high water in the Sacramento River and Sutter By-Pass, there is some localized flooding within the District. One proposal is to increase the pumping capacity at our Main Pumping Plant to overcome the localized flooding.

**Other Alternatives:** Install a pumping system at a location other than the Main Pumping Plant such as mid way in the District to capture the water before it overtops the District canals.

**Responsible Office:** Reclamation District 70

**Priority (High, Medium, Low):** Medium

**Cost Estimate:** \$100,000

**Benefits:** Prevent short term flooding of county roadways and flooding of private property.

**Potential funding:** HMGP, Local funds, private funds.

**Schedule:** 2008

## RECLAMATION DISTRICT 1660

### **ACTION #1: SUTTER BY-PASS PROJECT**

**Issue/Background:** During high flows in the Sutter By-Pass, the levee system just north of McClatchy Road is subject to major seepage, and at one location at pumping plant # 3 has a direct flow of water under the levee into the drainage ditch.

**Other Alternatives:** To install either a French drain or a slurry wall for several hundred feet in this area to relieve the pressure on this site.

**Responsible Office:** Reclamation District 1660

**Priority (High, Medium, Low):** High

**Cost Estimate:** \$100,000

**Benefits:** Without repair this could cause a major levee failure in the Meridian basin.

**Potential funding:** HMGP, Corp of Engineers, Local funds.

**Schedule:** 2008-2009

# Multi-Hazard Mitigation Plan

## 6.0 Plan Adoption

*44 CFR requirement 201.6(c)(5): “{The local hazard mitigation plan shall include} documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).”*



The purpose of formally adopting this plan is to secure buy-in from participating jurisdictions, raise awareness of the plan, and formalize the plan’s implementation. The adoption of this plan completes Step 9 of the Plan Development Process: Formal Plan Adoption. The governing board for each participating jurisdiction have adopted this Multi-Hazard Mitigation Plan by passing a resolution. A copy of the generic resolution and the executed copy is included in Appendix D.

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# Multi-Hazard Mitigation Plan

## 7.0 Plan Implementation and Maintenance

*44 CFR Requirement 201.6(c)(4): “{The plan maintenance process shall include a} section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.”*

Implementation and Maintenance of the plan is critical to the overall success of Hazard Mitigation Planning. This is Step 10 of the 10 step Plan Development Process.

### Implementation

Upon adoption, the plan faces the truest test of its worth: implementation. Implementation implies two concepts: action and priority. These are closely related. While this plan puts forth many worthwhile and high priority recommendations, the decision about which action to undertake first will be the first task facing the HMPC. Fortunately, there are two factors that help make that decision. First, there are high priority items and second, funding is always an issue. Thus, pursuing low or no-cost high-priority recommendations will have the greatest likelihood of success.

Another important implementation mechanism that is highly effective and low-cost, is to incorporate the Hazard Mitigation Plan recommendations and their underlying principles of this into other community plans and mechanisms, such as the General Plan, Drainage Plans, and capital improvement budgeting. The County and participating jurisdictions have and continue to implement policies and programs to reduce losses to life and property from natural hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs, and recommends implementing projects, where possible, through these other program mechanisms. **Mitigation is most successful when it is incorporated within the day-to-day functions and priorities of government and development.** This integration is accomplished by constant, pervasive and energetic efforts to network, identify and highlight the multi-objective, win-win benefits to each program, the Sutter County community, and its stakeholders. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community.

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how any required local match or participation requirement can be met. When funding does become available, the HMPC will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state or federal earmarked funds, and grant programs including those that can serve or support multi-objective applications.

Additional mitigation strategies could include consistent and ongoing enforcement of existing policies, and vigilant review of county-wide programs for coordination and identification of multi-objective opportunities.

## **Mitigation Coordinating Committee (HMPC)**

With adoption of this plan, the HMPC will be tasked with plan implementation and maintenance. This Mitigation Coordinating Committee (i.e., HMPC), led by the Sutter County Office of Emergency Services, agrees to:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision-making by identifying plan recommendations when other community goals, plans and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to assist the community in implementing the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update this plan;
- Report on plan progress and recommended changes to the governing boards for the communities; and
- Inform and solicit input from the public.

The Committee will not have any powers over county or city staff; it will be purely an advisory body. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities for the Sutter County Planning Area. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the county and city websites.

## **Maintenance**

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation, and to update the plan as progress, roadblocks or changing circumstances are recognized.

### **Maintenance Schedule**

In order to track progress and update the Mitigation Strategies identified in the Action Plan the County will revisit the Multi Hazard Mitigation Plan annually, or after a hazard event. The Sutter County Office of Emergency Services is responsible for initiating this review and will consult with members of the HMPC. This monitoring and updating will take place through a semi-annual review by the Sutter County Office of Emergency Services, an annual review through the HMPC, and a 5-year written update to be submitted to the state and FEMA Region

IX, unless disaster or other circumstances (e.g., changing regulations) lead to a different time frame.

### **Maintenance Evaluation Process**

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the Plan. Changes in vulnerability can be identified by noting:

- Lessened vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will consider:

- Changes in vulnerability due to project implementation
- Document success stories where mitigation efforts have proven effective
- Document areas where mitigation actions were not effective
- Document any new hazards that may arise or were previously overlooked
- Incorporating new data or studies on hazards and risks
- Incorporate new capabilities or changes in capabilities
- Incorporate growth and development-related changes to Planning Area inventories
- Incorporate new project recommendations or changes in project prioritization

In order to best evaluate any changes in vulnerability as a result of plan implementation, the HMPC will follow the following process:

- A representative from the responsible office identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the HMPC on the status of a given project and provide input on whether the project as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities; and
- If the project does not meet identified objectives, the HMPC will determine what additional measures may be implemented and an assigned individual will be responsible for defining project scope, implementing project, monitoring success of project, and making any required modifications to the plan.

Changes should be made to the plan to accommodate projects that have failed or are not considered feasible after a review for their consistency with established criteria, the time frame, community priorities, and funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, should be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as the HMPC deems appropriate and necessary, and as approved by the governing board of each participating jurisdiction. In keeping with the process of adopting the plan, a public involvement process to receive public comment on plan maintenance and updating should be held during the annual review period, and the final product adopted by the governing boards, appropriately.

## **Incorporation into Existing Planning Mechanisms**

The Mitigation Strategy listed in Section 5.3 of this plan recommends utilizing existing plans and/or programs to implement hazard mitigation in the Sutter County Planning Area, where possible. This point is also emphasized previously in this Implementation and Maintenance section. Based on this plan's capability assessment, the Planning Area has and continues to implement policies and programs to reduce losses to life and property from natural hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs, and recommends implementing projects, where possible, through the following mechanisms:

- Sutter County General Plan
- Yuba City General Plan
- City of Live Oak General Plan
- Harter Specific Plan
- Lincoln East Specific Plan
- West Yuba Drainage Study
- Urban Water Management Plan
- County Code of Building Regulations
- City Ordinances
- Capital Facilities Plans and Budgets
- Other plans, regulations, and practices outlined within the Capability Assessment section of this plan and/or those developed or under development by participating jurisdictions.

## **Continued Public Involvement**

Continued public involvement is also imperative to the overall success of the plan and implementation of the mitigation strategy. The update process provides an opportunity to publicize success stories from the plan's implementation, and seek additional public comment. A public hearing(s) to receive public comment on plan maintenance and updating should be held during the update period. When the HMPC reconvenes for the update they will coordinate with all stakeholders participating in the planning process – or that have joined the Committee since inception of the planning process – to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available web postings and press releases to the local media outlets, primarily newspapers and AM radio stations.